6.—ON JURASSIC AMMONITES FROM WESTERN AUSTRALIA.

BY

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CONTENTS.

INTRODUCTION.

The majority of the Western Australian ammonites described by Neumayr[1] and Crick[2] have always seemed to me rather unusual and different from European species of the Bajocian; and I was glad to receive, through the kindness of Professor E. de C. Clarke of the University of Western Australia, Crawley, a small assemblage of forms from the same deposits but of more familiar aspect. The new collection included especially a *Dorsetensia*, and some Stephanoceratids which resembled species from the English Inferior Oolite; and the conclusions of Whitehouse[3] as to the age of the Middle Jurassic deposits of Western Australia seemed confirmed. Yet the re-examination of Crick's types makes me hesitate to accept the general opinion that the ammonites so far described from Western Australia all indicate a single horizon. The localities are widely scattered; there are various types of matrix and preservation; and, knowing how fragmentary are all Jurassic successions even in far more thoroughly explored areas, it seems improbable that the fossiliferous bands in a variable series of deposits such as the Jurassic of Western Australia are of exactly the same age. It will be attempted in the following pages to review the evidence and discuss the relationship of the ammonites so far known from Western Australia.

[1] Die geographishe Verbreitung der Juraformation. *Denkschr. k. Akad. Wiss. Wien*, vol. 50, 1885, p. 140, pl. I., figs. 3-4.

[2] On a Collection of Jurassic Cephalopoda from West Australia, etc. *Geol. Mag.*, Dec. iv., vol. i., 1894, pp. 385-393; 433-441, pls. xii., xiii.

[3] Some Jurassic Fossils from West Australia. *Journ. Roy. Soc. W. Aust.*, vol. xi., 1925, p. 11.

After the MS. had been sent out to Australia, Dr. C. Teichert kindly forwarded some more ammonites from the same beds, including the holotype of *Dorsetensia "etheridgei."* I was thus able to make a few additions; and I was also glad to adopt his suggestions regarding the illustrations now included in this paper. Furthermore, I have to thank him for directing my attention to the two accounts by A. G. Maitland and for communicating the present paper.

II.—THE GROUP OF *STEPHANOCERAS LEICHARTI* NEUMAYR.

The Stephanocratid ammonites described by Neumayr and Crick (with one exception) belong to a rather well defined group, characterised by cadicone inner whorls that remain first smooth and then striate to a comparatively late stage (up to 25 mm. diameter). Tuberculation appears very gradually, is rather close to the umbilical suture, not at the middle of the whorl-side, and the high and often vertical umbilical slope may be perfectly smooth. It will be noticed that even in the Bathonian *"Stephanoceras* sp. nov." figured by Gemmellaro[1] which has the smooth umbilical slope of the Australian forms, the tubercles are already strong at a small size and about half-way up on the whorl-side.

The secondary ribs meeting in bundles at the umbilical nodes are blunt and projected, even after becoming coarse; the primary ribs are either indistinct, short, or altogether wanting. Neumayr's *Stephanoceras leicharti* well shows the characteristic features of the outer whorls, also the elevated whorl-section. It is therefore now taken as type of the new genus *Pseudotoites,* nov., proposed for the group under discussion.

Dr. Teichert tells me that Neumayr's original publication is not accessible in Western Australia, and, on his suggestion, I am taking the opportunity of reproducing the figures of the holotype of *P. leicharti* Neumayr sp. (see Plate I., fig. 1; Pl. II., fig. 4).

Crick's forms are not easily recognised from the greatly reduced illustrations and they are rather badly preserved and worn; but his *Ammonites* (*Perisphinctes*) *championensis* is merely a more delicately ribbed edition of *P. leicharti,* converging towards the perisphinctid genera *Choffatia* or *Indosphinctes,* while *Amm.* (*Perisphinctes*) *robiginosus* Crick (with which I include Crick's second example of *Amm. championensis,* B.M., No. C. 4708), is a more robust development in the opposite direction. *Amm.* (*Sphaeroceras*) *semiornatus,* Crick, especially the larger paratype, is still more finely ribbed than *Amm. championensis* of which species Crick's *Amm.* (*Stephanoceras*) sp. is probably a (distorted?) fragment; but *Amm.* (*Stephanoceras*) *australis* Crick, though resembling *Normannites,* may represent merely the poorly preserved inner whorls of one of the large forms of the *leicharti-robiginosus* group. Whether Neumayr's *Stephanoceras blagdeni* (*non* Sowerby) and his *Perisphinctes* sp. belong to the group in question is doubtful; Crick's *Amm.* (*Sphaeroceras?*) *woodwardi* on the other hand is probably distinct, as will be shown below.

[1] Sopra alcune faune giurese e liasiche della Sicilia V. Sopra alcuni fossili della zona con Posidonomya alpina Gras di Sicilia. *Giorn. Sci. Nat. Econ. Palermo,* vol. xii., 1877, p. 147, pl. xix., fig. 2.

[2] Compare, e.g., *Indosphinctes rusticus,* Spath, Pal. Indica, N.S., vol. ix., No. 2, part 4, 1930, p. 343, pl. lxxx., fis. 7a, b,

In connection with this peculiar *leicharti* group it may be recalled that Chapman [1] recorded an example of *Perisphinctes championensis* with an *aptychus* which was described as rather thin, "a usual character in the *aptychi* known to occur in the Perisphinctidae." The granulate structure of the outer layer was similarly said to correspond with Zittel's group of the *granulosi* "to which the Perisphinctidae seem to belong." This also suggests that the *leicharti* group is distinct from the typical Stephanoceratids, for although very small *aptychi* have been recorded [2] in some doubtful forms, and in various *Stephanoceras*-derivatives, it is improbable that genera like *Otoites* or *Normannites*, with contracted mouthborders and lateral apophyses (at least in the adult), were provided with *aptychi*.

III.—COMPARISON WITH OTHER STEPHANOCERATIDS.

The genus *Otoites* Mascke,[3] to which Whitehouse referred some of the Australian forms, was described as including narrowly-umbilicated ammonites which are globular in the young. *Otoites* is also more or less dwarfed, and excentrumbilicate, with a contracting body-chamber. Comparing the genotype, *O. sauzei* (d'Orbigny)[4] with Neumayr's figure of his *Stephanoceras leicharti*, it will be seen at once that among other differences, the position of the umbilical tubercles is not the same in the two stocks; and the evolute and smooth inner whorls of *Amm. semiornatus* or *Amm. robiginosus*, Crick, do not show much resemblance to a globose young *Otoites*. The Australian group under discussion, in fact, seems to have less affinity with *Otoites* than with many late Stephanoceratid offshoots mentioned by Crick,[5] e.g. *Cadoceras*, *Erymnoceras*, *Olcostephanus*, *Spiticeras*, *Perisphinctes*, *Wagnericeras*, *Obtusicostites*, or even *Polyptychites* and *Rasenia*. Almost the only *Stephanoceratids* of Bajocian age that show features reminiscent of the *leicharti* group are, first the early genus *Docidoceras*, Buckman[6] (*discites* zone) which gave rise both to the typical *Stephanoceras* (*humphriesianum* group) and to *Emileia*; and secondly, *Teloceras warreni* McLearn,[7] at least as regards the tuberculate umbilical edge. The secondary rib-bundles, uniting at the tubercles in this species, are also similar to those of the West Australian forms. Yet the resemblance is superficial; for, apart from the inflation of the Canadian shell, the inner whorls of *T. warreni* are those of a true *Teloceras*, whereas *Zemistephanus*, McLearn, to which genus *T. warreni* is somewhat transitional, has still more exaggerated tuberculation. *Docidoceras* entirely lacks the characteristic smooth and vertical umbilical edge of the Australian ammonites.

The fact that the Canadian Stephanoceratids also show local peculiarities suggests that the Australian *leicharti* group may represent merely a special development, characteristic of a distinct province, and that no time signifi-

[1] On a Collection of Upper Palaeozoic and Mesozoic Fossils from West Australia, etc. *Proc. Roy. Soc. Victoria*, vol. xvi., N.S., pt. 2, 1904.

[2] See Trauth: Aptychenstudien. V. Die Aptychen des Dogger. *Ann. Naturhist. Mus. Wien*, vol. xliv., 1930, pp. 380, etc.

[3] Die Stephanoceras-Verwandten in den Coronatenschichten von Norddeutschland. *Inaug. Dissert.* Göttingen, 1907, p. 25.

[4] Pal. Française, Terr. Jurass., vol. i., 1846, p. 407, pl. cxxxix., figs. 1-3.

[5] Not with the same generic names.

[6] Type Ammonites. Vol. iv., 1922, pl. cccxiv. (*D. perfectum*).

[7] Three Fernie Jurassic Ammonoids. *Trans. Roy. Soc. Canada*, ser. 3, vol. xxvi., sect. 4, 1932, p. 113, pls. iii. and iv.

cance is attached to such horizontal variations. But the Stephanoceratids known from New Guinea[1] or the Malay Archipelago[2] are not strikingly different from European types. I may add that a Stephanoceratid, namely a small *Cadomites*, has now been found by Mr. J. H. Smith in Kachh (bed 26 of Jumara,[3] lowest white limestones with corals and brachiopods) so that the assemblage is acquiring a striking similarity to Lower Bathonian faunas known from Europe, e.g. Sicily. On the other hand, no coronate Bajocian Stephanoceratid of 46 inches diameter, such as a form described by Whitehouse, has ever been found, so far as I know, either in Europe or anywhere else. The largest examples in the British Museum are only a foot or so in diameter, whereas giants are common among the *coronati* of the Callovian (*Erymnoceras*).

IV.—THE ASSOCIATED AMMONITES.

Fortunately, the forms of the curious *leicharti* group are accompanied by other ammonites, e.g. Crick's *Dorsetensia clarkei* and *Amm.* (*Sphaeroceras* ?) *woodwardi*, the types of which are before me. I think Dr. Whitehouse will now agree with me that the former is probably a *Dorsetensia* and not a *Sonninia*, as he thought in 1924; and Crick correctly stated that the genus was common in the *humphriesianum* zone but occurred already in the *sauzei* zone. *Amm. woodwardi*, which I would include in the genus *Normannites*, also indicates the *sauzei* zone; but only if I am right in identifying it with a species of *Normannites*, which is represented in the new collections by two examples in a much better state of preservation than Crick's original. One of these is now figured (Plate II., figs. 3a, b) and it will be seen that the bullate tubercles only appear on the last whorl. *N. woodwardi*, in fact, is only a more involute form of the stock that produced *N.* (*"Epalxites"*) *formosus* (S. Buckman)[4] but its earlier whorls are smoother.

The mode of preservation, however, again suggests caution; and association in a condensed deposit does not imply contemporaneity. The *Dorsetensia*, in an orange or brownish limestone, undistorted, and with the suture-line perfectly displayed, may or may not have come out of the same bed as some of the Stephanoceratids, but these are either crushed distorted and worn casts, sometimes entirely limonitic, or else preserved in a red limestone which is distinctly conglomeratic and patchy. These specimens again all look badly worn. The "friable somewhat sandy limestone, yellowish-brown, with purplish patches," in which Neumayr's small suite of fossils was preserved may represent a similar type of rock. It is thus not impossible that the variegated bed which yielded these fossils represents a condensed deposit in which elements of different age became mixed, though there may be little evidence of disturbance in the field.

V.—REVIEW OF THE LOCALITIES.

With regard to the new assemblage, from Mt. Hill, about 30 miles S.E. of Geraldton, I am assured by Dr. C. Teichert, now at the University of Western Australia, that the ammonites must all have come from the same

[1] Gerth: Beiträge zur Palæontologie und Stratigraphie des indischen Archipels. II. *Leidsche geol. Meded.*, Deel ii., Afl. 3, vol. vii., 1927, p. 226.

[2] Wanner: Mesozoicum. *Leidsche geol. Meded.* (Festb. K. Martin), 1931, pp. 584, etc.

[3] See Spath: Revision of the Jurassic Cephalopod Fauna of Kachh (Cutch). *Pal. Indica*, N.S., vol. ix., No. 2, part vi., 1933, p. 760.

[4] Type Ammonites, vol. III., 1920, pl. 551.

horizon. The matrix again is a yellowish to greyish-brown, shelly limestone, with red patches, and rather conglomeratic, but the fossils are not worn. Dr. Teichert's inspection of the fossil locality was rather hurried, but he tells me (*in litt.*) that the two species most frequently found are *Dorsetensia clarkei* and a globular ammonite [Stephanoceratid?], which two forms, moreover, are also rather common around Newmarracarra, east of Geraldton.

The ammonites described by Chapman, Etheridge[1], and Whitehouse also came from the Greenough River district, as did those recorded by Crick as from near Champion Bay. Neumayr's specimens may have come from farther away since he considered the locality "Glenelg River" to be perhaps the Moore River, 60 miles north of Perth. A misreading of Glenelg for Greenough River seemed possible, but Mr. A. Gibb Maitland[2] thinks Neumayr's locality was the Moore River, being adjacent to the area from which Moore's fossils came.

One of Crick's ammonites, it is true, is labelled "Cape Riche, about 50 miles east of Albany"; and this locality, on the south coast of Western Australia, is 500 miles away from the Greenough River. I may add, however, that on H. P. Woodward's[3] geological map no Mesozoic deposits are indicated anywhere south of Perth; and the variegated matrix of the Cape Riche ammonite is identical with that of the Champion Bay specimens.

There must be some error about the locality and, in fact, A. G. Maitland, as long ago as 1907,[4] suggested that Crick's Cape Riche ammonite had been wrongly localised. Though the outcrop of Mesozoic rocks on Woodward's and Maitland's maps extends over some 600 to 650 miles, Glauert's[5] lists suggest that the localities are all on the Greenough River or at least in the neighbourhood of Geraldton (Shark Bay also being doubtful, according to Moore).

VI.—THE NEW MT. HILL ASSEMBLAGE.

The Mount Hill fauna now before me consists of the following cephalopods:—

Dorsetensia clarkei (Crick).
Normannites woodwardi (Crick).
Normannites sp. (cf. *woodwardi* Crick?)
Normannites sp. (cf. *australis* Crick?)
Emileia? sp. nov.?
Emileia? sp. juv. (inner whorls).
Belemnopsis spp. ind.

[1] Oolitic Fossils of the Greenough River District, W. Australia. *Geol. Surv. W. Aust., Bull.* 36, 1910, pp. 38-39.

[2] Geol. Survey W. Aust., Mem. No. 1, (1919), 1920, p. 41.

[3] Geological Sketch Map of Western Australia (1 : 3 000 000), Perth, 1894.

[4] Australas. Assoc. Advanc. Sci., vol. xi., 1907, p. 152

[5] A list of Western Australian Fossils. *Geol. Surv. W. Aust., Bull.* No 36, 1910, p. 105. I cannot find the authority for the inclusion of "*Amm. lautus*" in the list of Jurassic fossils. The ammonite is marked as being in the Geological Society Collection, but the only two ammonites in existence (and now in the British Museum, Nat. Hist.) are those listed in the Quarterly Journal of the Geological Society (vol. xvii., 1861, p. 483), namely a body-chamber fragment of a form of the *semicrnatus* type, from the Moresby Range (associated with *Trigonia*, and a Gingin Chalk ammonite from the foot of Mt. Albert. The latter is comparable to the Pachydiscids described on a former occasion (Spath, Note on Two Ammonites from the Gingin Chalk, *Journ. Roy. Soc. W. Aust.*, vol. xii., 1926, pp. 53-55).

The first shows an extraordinarily close resemblance, even in suture-line, to *Grammoceras* (*striatulum* group) of the Upper Lias, as previous authors noticed, so that it is chiefly the association with the Stephanoceratids that suggests reference to the genus *Dorsetensia*. There exist, however, sufficiently similar forms of *Dorsetensia*, for example the European *D. deltafalcata* (Quenstedt)[1] or the South American *D. subdeltafalcata*, (Tornquist)[2], to make it probable that this is not a case of persistence of a Toarcian element into the Middle Bajocian, but merely heterochronous homoeomorphy.

The sharply-ribbed Normannites sp. (cf. *woodwardi*) is half-way between *N. depressus* (Whitehouse) and the typical *N. woodwardi*, differing from the latter chiefly in its greater whorl-thickness (60% instead of 45%) and in consequence a steeper umbilical slope. The second species of *Normannites* is a more finely ribbed form and therefore closer to the true *Amm. braikenridgei*, Sowerby[3] than the first. If identical with the badly preserved holotype of *Amm. australis*, Crick, the latter must be removed from the *leicharti* group, i.e. the genus *Pseudotoites*.

The species of *Emileia* (?), doubtfully listed as new, looks like a *Teloceras*, as it rapidly expands; but it has finely ribbed and rather evolute inner whorls, so that it may be compared to one of the examples of *Amm. coronatus*, figured by Quenstedt,[4] or to the (far less inflated) *A. brocchii* (*non* Sowerby), figured by Waagen.[5] There is no contraction, however, at the end of the shell, and since the example is worn, it is not impossible that it is referable to *Teloceras* or perhaps to the un-named large coronate genus mentioned by Whitehouse. A smaller specimen, however, if belonging to the same form, as seems probable, favours the reference to *Emileia*. Another specimen of the same type, received with the second collection is figured in Plate I., figs. 3a, b. It has no tubercles and the inner whorls are almost smooth, but it is too immature for exact comparison.

VII.—THE AGE OF THE FAUNA.

The belemnites, like Crick's *Nautilus perornatus*, are not helpful for exact dating of the assemblage; but the vertical distribution of the Stephanoceratids is now sufficiently well established to justify the reference of this Mt. Hill fauna to the *sauzei* zone. *Emileia* appears (*ex Docidoceras*) in the lower *sowerbyi* zone (*discites* subzone)[6] and persists (in "*Frogdenites*") into the upper *sauzei* zone, but it is gradually being replaced by *Sphaeroceras* s.l. (including *Chondroceras*, *Labyrinthoceras*, etc.) in this *sauzei* zone, the Sphaeroceratids attaining their maximum in the *humphriesianum* zone but going up into the *parkinsoni* zone.

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[1] See in Haug: Etudes sur les Ammonites des étages moyens du système Jurassique I. *Bull. Soc. géol. France*, ser. 3, vol. xx., 1893, p. 293, pl. ix., fig. 9.

[2] Der Dogger am Espinazito Pass, etc., *Pal. Abhandl.*, N.S., vol. iv., 1898, p. 156, pl. xviii., fig. 7.

[3] Refigured in Buckman: Yorkshire Type Ammonites, vol. ii., 1914, pl. lxxxi. (included in *Otoites*).

[4] Ammoniten des schwäbischen Jura., II., 1886, p. 547, pl. lxvii., fig. 6.

[5] Uber die Zone des *Ammonites sowerbyi*. *Geogn. Pal. Beitr.* (*Benecke*), vol. i., 1868, p. 601, pl. xxiv., figs. 3a, b.

[6] See Spath: Bajocian Ammonites and Belemnites from Eastern Persia (Iran). *Pal. Indica*, N.S., vol. xii., No. 3, 1936, p. 16.

Stephanoceras itself, also derived from the stock that produced the early *Docidoceras*, with its various offshoots, like the extremely evolute *Skirroceras* or the dwarfed *Phaulostephanus*, ranges through all the subzones of the *sowerbyi*, *sauzei* and *humhriesianum* zones, while its final development, *Cadomites*, persists into the Bathonian. *Otoites* is not definitely known in the lower (*discites*) and middle (*trigonalis*) subzones of the *sowerbyi* zone, unless *Trilobiticeras*, Buckman, is an early form of *Otoites;* but it occurs in the upper division (*laeviuscula* subzone), and is dominant in the lower and upper *sauzei* zone, where it is being gradually replaced by *Normannites*. First *Stemmatoceras* and then *Teloceras* are the typical elements of the lower (*romani* subzone) and upper *humphriesianum* zone (*blagdeni* subzone).

Now, while it is not difficult to place in this time-scale (assuming the vertical distribution to hold universally) the well-preserved *Normannites woodwardi*, *N. deprsessus*, etc., whichever genus they are referred to, there is no guidance for dating the badly preserved and worn forms of *Pseudotoites*, i.e., the *leicharti* group. For, if they are derived, they would have to be even earlier than the *sauzei* zone, and not later, as might be thought probable from their morphological characters. We are thus driven to the conclusion that *Pseudotoites* represents a local, Australian genus of Stephanoceratids, existing during *sauzei* or perhaps *sowerbyi* times, which has no counterpart elsewhere, yet shows features characteristic of various late *Stephanoceras* derivatives.

It is highly desirable, however, to investigate more critically the conditions of deposition of the ammonite bearing bed or beds, and to collect more favourably preserved examples of the species of *Pseudotoites* above discussed, noting their association with fossils that cannot have been derived. Of course, if Cricks' Champion Bay specimens should have been collected from the bed of the Greenough River, as seems possible,[1] their worn condition is readily explained.

VIII.—NOTE ON *DORSETENSIA CLARKEI*, CRICK.

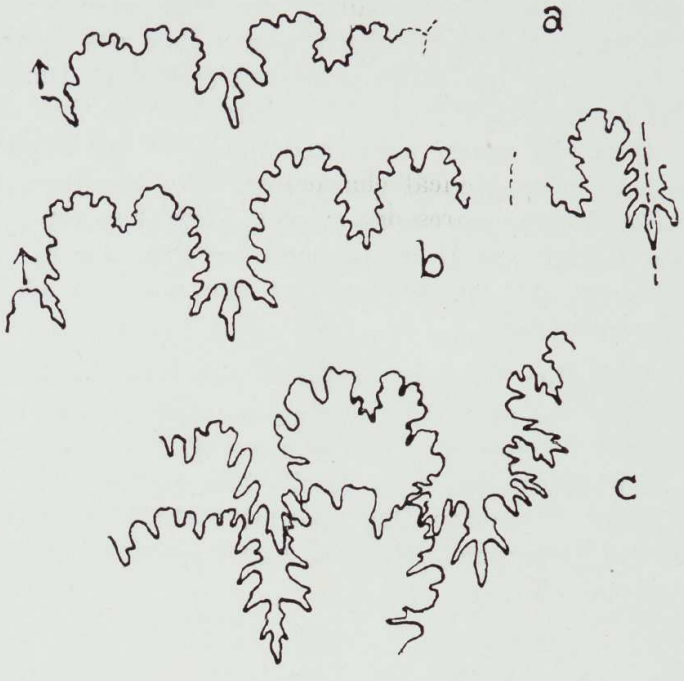
Having sent me the holotype of *D. etheridgei*, Whitehouse (because it had never been described in detail), Dr. Teichert suggested that I add a note on the results of my re-study of that form as well as on its relations to *D. clarkei*, Crick. I gladly adopt this suggestion and hope that at any rate the figures will prove useful to geologists in West Australia.

Crick's greatly reduced figure made it difficult to recognise *D. clarkei*, but there is not a single feature on which separation of the two species could be based. Etheridge had not misinterpreted *D. clarkei*, as Whitehouse thought; for both his Tibraddon specimen (pl. ix., fig. 7) and the Snake Farm example (pl. vi., fig. 4) show almost perfect agreement with Crick's type, even in the mode of preservation. In addition to these three figured specimens I have now before me two more typical examples from Mt. Hill, also the inner whorls and the large fragment figured in Plate I., fig. 2 and Plate II., figs. 2a, b. There are slight differences in the suture-lines (Text-fig. 1a, b), and in the width of the periphery, or in the more or less gradual disappearance of the two grooves accompanying the keel as the shell in-

[1] See F. T. Gregory: On the Geology of Part of Western Australia. *Quart. Journ. Geol. Soc.*, vol. xvii., 1861, p. 480.

creased in size. But these differences are not sufficient to make even varieties and I am therefore including all these seven examples in the one species *D. clarkei,* Crick.

Since the original figure was reduced and the suture-line somewhat too diagrammatic (with the outer half of the external saddle corroded) I am refiguring Crick's holotype (Plate II., figs. 1a, b) and it will be seen that it is indistinguishable from a portion of Etheridge's larger specimen (pl. ix., fig. 7), comprising the left-hand portion, from the last break but one, to about a quarter of a whorl from the end (Etheridge's figure is reduced x 4/5). The only difference I can see is that the lobes are more dependent towards the umbilical suture than in the type.



Text-fig. 1.—Suture-lines of (a) *Dorsetensia clarkei,* Crick, small specimen figured in Plate II., fig. 2, enlarged x 4; (b) larger fragment, represented in Plate I., fig. 2 (with umbilical edge damaged), enlarged x 2; (c) part of suture-line of very large example of *Dorsetensia* (?) sp. ind. discussed below.

In Etheridge's smaller specimen (pl. vi., fig. 4), the second lateral and auxiliary lobes again are as ascending inwards as in the suture-lines here figured; but this second specimen is slightly more compressed than Crick's type, also a difference of no consequence, especially since the preservation of both of Etheridge's examples is imperfect.

A large eighth specimen of a *Dorsetensia* (No. 800, from near Newmarracarra) is of interest because it combines the characteristic periphery of *D. clarkei,* i.e., a blunt and low median keel and faint lateral grooves, with a small umbilicus (about 23%). The specimen is of approximately 230 mm. diameter, separate to about 160 mm. and portions of the last few suture-lines are given in Text-fig. 1c to show that they are not strikingly different from those of smaller specimens. The ribbing is completely lost on the outer whorl, but since the septate part of the specimen is hollow and an attempt to uncover the inner whorls would only result in more or less complete destruction of the ammonite, it is impossible to compare them with the examples of *D. clarkei* above discussed. I can only say that if this large

example belongs to Crick's species, then the contraction of the umbilicus from 46% to 23% is rather remarkable. Judging from the aspect of the outer whorl alone, however, the specimen might also be a *Witchellia*, for forms like *W. falcata*, S. Buckman,[1] at the diameter of the Australian specimen, are smooth and very similar, even in suture-line.

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[1] Type Ammonites, vol. VI., 1926, pl. 688.

EXPLANATION OF PLATES.

Plate I.

Fig. 1.—*Pseudotoites leicharti* (Neumayr). "Glenelg" (= Moore) River. Copy of fig. 4a of Neumayr's plate. (For peripheral view see Plate II., fig. 4.) Original in the Geological Institute of the University of Vienna.

Fig. 2.—*Dorsetensia clarkei*, Crick. Part of a fragmentary example from 19m. cutting, near Newmarracarra. (For suture-line see Text-fig. 1b.) (Univ. W. Aust. Coll.)

Fig. 3.—*Emileia* (?) sp. juv. Showing smooth inner whorls. Mt. Hill. (Same Coll.)

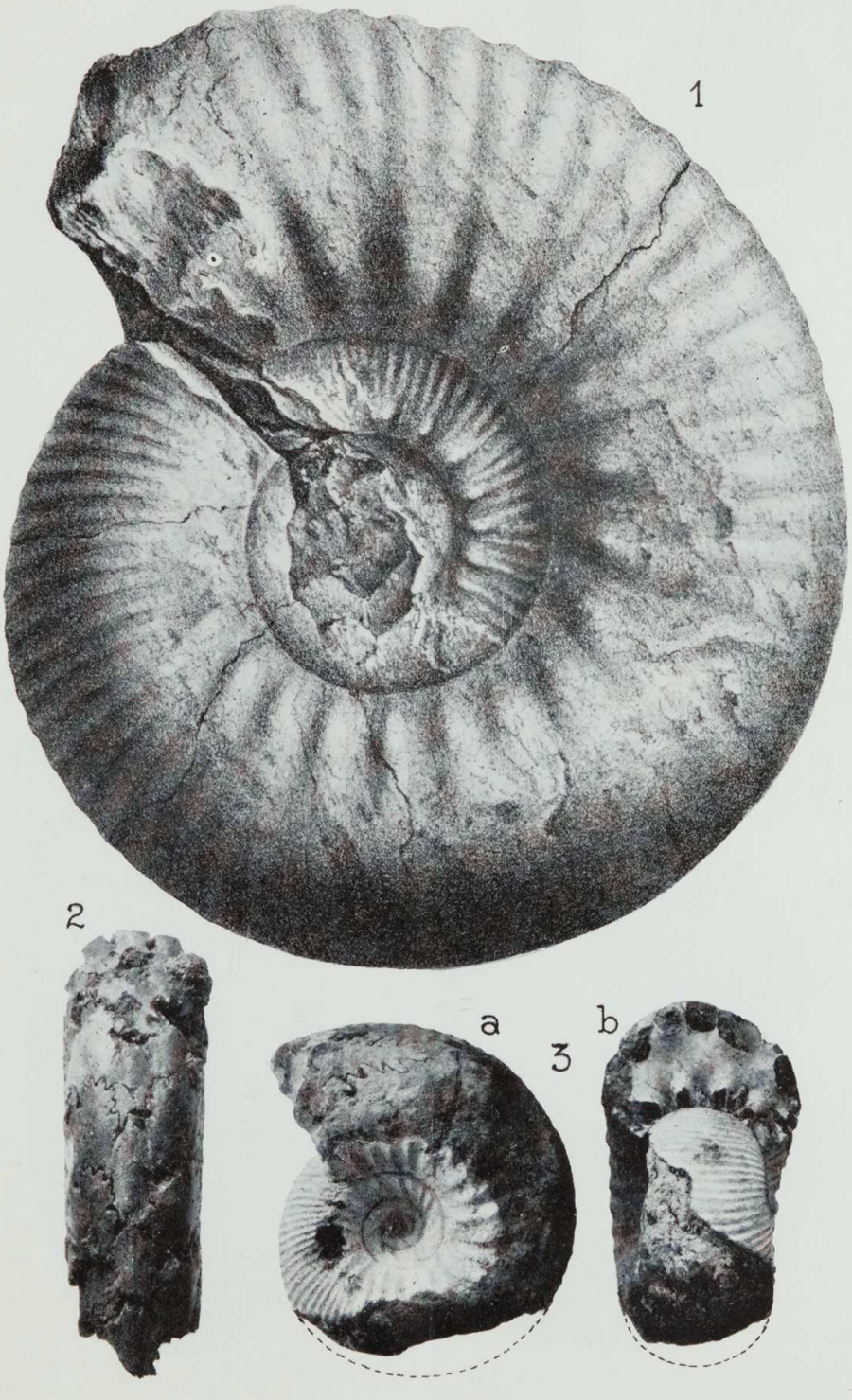

PLATE I.

Plate II.

Fig. 1.—*Dorsetensia clarkei*, Crick. Holotype. Champion Bay. (British Mus. [Nat. Hist.], No. C30376.)

Fig. 2.—*Dorsetensia clarkei*, Crick. Inner whorls. Fossil Hill, near Newmarracarra. (Univ. W. Aust. Coll., No. 5146.) Compare sharp keel with blunt carina of Plate I., fig. 2 (both casts).

Fig. 3.—*Normannites woodwardi* (Crick). Example from Mt. Hill, believed to be same species as badly-preserved holotype from Champion Bay. (Univ. W. Aust. Coll.) Complete, with mouth-border partly preserved; last suture-line at x.

Fig. 4.—*Pseudotoites leicharti* (Neumayr). Peripheral view of the ammonite figured in Plate I., fig. 1. (Copy from Neumayr.)

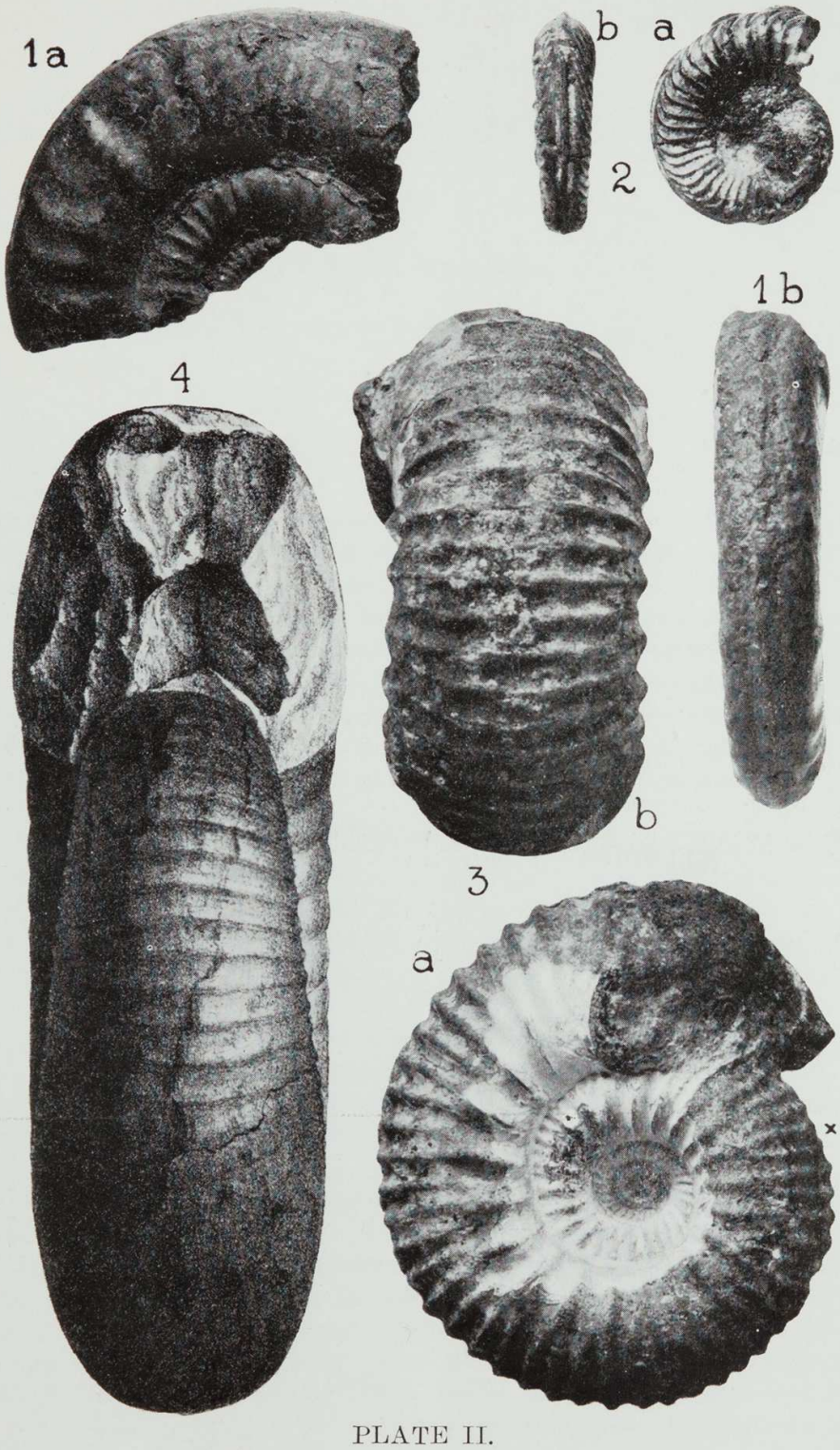

PLATE II.